FONAR CORPORATION and Dr. Raymond V. Damadian, Plaintiffs/Cross–Appellants,

v.

GENERAL ELECTRIC COMPANY, and Drucker & Genuth, Mds, P.C., d/b/a South Shore Imaging Associates, Defendants–Appellants.

Nos. 96–1075, 96–1106 and 96–1091.

United States Court of Appeals,
Federal Circuit.

Feb. 25, 1997.

Rehearing Denied; Suggestion for Rehearing In Banc Declined May 8, 1997.*

Verdict Summary by FONAR
(Literal decision of the Court - see pages 1555-1556 below)

On May 27, 1997 the Honorable Wm. H. Rehnquist, Chief Justice, the United States Supreme Court, enforced the Order of the Federal Circuit Court of Appeals and ordered G.E. to pay Fonar. G.E. paid Fonar $128,705,766 for patent infringement. G.E. was further restrained from any use of Fonar technology.

The Court found that G.E. had infringed U.S. Patent 3,789,832, MRI's first patent, which was filed with the U.S. Patent Office in 1972 by Dr. Damadian. The Court concluded that MRI machines rely on the tissue NMR relaxations that were claimed in the patent as a method for detecting cancer, and that MRI machines use these tissue relaxations to control pixel brightness and supply the image contrasts that detect cancer in patients.*

The Court also found infringement of U.S. Patent 4,871,966 concerning a technique of obtaining MRI images at multiple angles.

AFFIRMED BY THE UNITED STATES SUPREME COURT

* The patent also discloses the first ever *comparison* study of the tissue NMR relaxations of the *normal* tissues thus demonstrating for the first time that the discovery by Dr. Damadian of the dramatic *differences* in the NMR relaxations of living tissues disclosed in the patent is true for living tissue in *general*. The discovered relaxation differences of *both* the cancerous and *normal* tissues are an integral part of the Court enforced 1972 patent claims (Claim 1a,1b,1c) establishing *standards* for the *normal* tissues and malignant tissues of the same type. The NMR relaxation differences disclosed in the patent for normal tissues as well as for cancers are used throughout MRI imaging to supply and *control* pixel contrast. *The tissue NMR relaxation, which does not exist in any other imaging modality, provides the exceptional contrast of MRI (10 to 30 times that of x-ray) and is responsible for the extraordinary beauty of the MRI image.*

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witness under the business records exception. Weber testified that he had seen the documents while attending a meeting at Allied–Signal However, he failed to testify concerning the record-keeping process related to them, a requirement for admissibility of documents under the business records exception. *See* Fed.R.Evid. 803(6). Thus, World failed to establish that Weber was a custodian or other qualified witness, *see id.*, and the district court thus did not abuse its discretion in excluding the documents.

F. *Attorney Fees and Frivolous Appeal*

[16] World requests damages under 35 U.S.C. § 284 as compensation for what it alleges are fraudulent acts of Kolmes. However, section 284 authorizes a court to award damages for infringement of a patent; World is the accused infringer and has not in this case prevailed in an infringement claim. Accordingly, World is not entitled to damages under section 284. World also requests an award of attorney fees under 35 U.S.C. § 285 ("The court in exceptional cases may award reasonable attorney fees to the prevailing party."). Because World is not the prevailing party, it is not entitled to attorney fees.

[17, 18] Kolmes requests an award of damages under Fed. R.App. P. 38, arguing that World's appeal is baseless. Rule 38 authorizes a court of appeals to award damages for a frivolous appeal, and we have held that appeals may be frivolous as filed or as argued. *State Indus., Inc. v. Mor–Flo Indus., Inc.*, 948 F.2d 1573, 1578, 20 USPQ2d 1738, 1742 (Fed.Cir.1991). An appeal is frivolous as filed if "no basis for reversal in law or fact can be or is even arguably shown." *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1554, 220 USPQ 193, 203 (Fed.Cir. 1983). Kolmes' request first fails for lack of a separate motion. *See* Fed. R.App. P. 38. On the merits, although World had many hurdles to overcome in its attempt to obtain a reversal, its appeal was not baseless and therefore was not frivolous as filed. Kolmes also argues that World's brief is misleading. We have carefully considered World's briefs and conclude that they do not evidence any sanctionable conduct. *See State Indus.*, 948 F.2d at 1579 n. 4, 20 USPQ2d at 1743 n. 4 (listing examples of sanctionable conduct). Because we conclude that World's appeal was not frivolous as filed or as argued (even considering its unfounded claims for attorney fees or damages under sections 284 and 285), Kolmes is not entitled to damages under Rule 38.

We have considered the parties' other arguments and conclude that they are either unpersuasive or unnecessary for resolution of this appeal.

CONCLUSION

The district court did not err in holding that the '948 patent is not invalid. It did not abuse its discretion in holding that the patent was not obtained by means of inequitable conduct and in denying entry into evidence of the Allied–Signal documents. World is not entitled to damages under section 284 or attorney fees under section 285. Because World's appeal was not frivolous, Kolmes is not entitled to damages under Fed. R.App. P. 38.

AFFIRMED.

FONAR CORPORATION and Dr. Raymond V. Damadian, Plaintiffs/Cross–Appellants,

v.

GENERAL ELECTRIC COMPANY, and Drucker & Genuth, Mds, P.C., d/b/a South Shore Imaging Associates, Defendants–Appellants.

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Patentee sued for infringement of patents concerning technique for using magnetic

* Circuit Judges Rich and Schall did not participate in the vote.

resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging and technique for using nuclear magnetic resonance (NMR) imaging to detect cancer. The United States District Court for the Eastern District of New York, Leonard D. Wexler, J., 902 F.Supp. 330, entered judgment on jury verdict in favor of patentee with respect to MAO patent but granted judgment as a matter of law (JMOL) to alleged infringer with respect to cancer detection patent. Parties appealed. The Court of Appeals, Lourie, Circuit Judge, held that: (1) MAO patent disclosed best mode; (2) MAO patent was infringed; (3) patentee was entitled to $34 million for infringement of MAO patent; (4) lapse of MAO patent for failure to pay maintenance fees did not preclude finding of infringement; (5) alleged infringer did not induce infringement of MAO patent; and (6) cancer detection patent was infringed under doctrine of equivalents.

Affirmed in part and reversed in part.

1. Federal Courts ⇐765

On appeal from judgment denying motion for judgment as a matter of law (JMOL) following jury trial, appellant must show that jury's findings, presumed or express, are not supported by substantial evidence or, if they were, that legal conclusion(s) implied from jury's verdict cannot in law be supported by those findings.

2. Patents ⇐98

Determining whether patent satisfies best mode requirement involves two factual inquiries: first, fact finder must determine whether at time applicant filed application for patent, he or she had a best mode of practicing the invention, which is a subjective determination; second, if inventor had a best mode of practicing invention, fact finder must determine whether best mode was disclosed in sufficient detail to allow one skilled in the art to practice it, which is an objective determination. 35 U.S.C.A. § 112.

3. Patents ⇐98

Patent concerning technique for using magnetic resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging satisfied best mode requirement, even though patent contained description of software's functions rather than disclosing computer code. 35 U.S.C.A. § 112.

4. Patents ⇐98

As a general rule, where software constitutes part of best mode of carrying out invention, description of such a best mode is satisfied by disclosure of functions of software. 35 U.S.C.A. § 112.

5. Patents ⇐98

Flow charts or source code listings are not a requirement for adequately disclosing functions of software, for purpose of satisfying best mode requirement of patent. 35 U.S.C.A. § 112.

6. Patents ⇐226.6

Determining whether patent claim has been infringed requires two-step analysis: first, claim must be properly construed to determine its scope and meaning; second, claim as properly construed must be compared to accused device or process.

7. Patents ⇐235(2)

Patent concerning technique for using magnetic resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging was infringed by accused MRI scanners.

8. Patents ⇐167(1)

If apparatus claim of patent does not recite definite structure in specification to support function in means clause, court construes means limitation in light of corresponding structure or acts disclosed in specification and their equivalents. 35 U.S.C.A. § 112.

9. Patents ⇐319(1)

Entire market value rule allows for recovery of damages based on value of entire apparatus containing several features, even though only one feature is patented, when patented feature is the basis for customer demand for entire machine. 35 U.S.C.A. § 284.

10. Patents ⇐319(1)

Evidence supported award of reasonable royalty based upon cost of entire machine as damages for infringement of patent concerning technique for using magnetic resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging, even though only the MAO feature of machine was patented; infringer's own technical literature emphasized MAO feature. 35 U.S.C.A. § 284.

11. Patents ⇐319(1)

Evidence supported award of reasonable royalty damages of $34.125 million for infringement of patent concerning technique for using magnetic resonance imaging (MRI) machine for multi-angle oblique (MAO) imaging; patentee's expert witness testified that reasonable royalty would have resulted in royalty of $54 million, there were no acceptable noninfringing alternatives, and patentee had capacity to manufacture machines whose sales it lost. 35 U.S.C.A. § 284.

12. Patents ⇐318(1)

In order to be entitled to lost profits, patentee must show reasonable probability that it would have made sales but for infringement. 35 U.S.C.A. § 284.

13. Patents ⇐312(1.7)

Patentee may establish inference of entitlement to lost profits from infringer by means of four-factor *Panduit* test, requiring proof of demand for the patented product, lack of acceptable noninfringing substitutes, capacity by patentee to meet demand, and amount of profit patentee would have made; burden then shifts to infringer to show that inference is unreasonable for some or all of the lost sales. 35 U.S.C.A. § 284.

14. Patents ⇐283(1)

Statute protecting person who makes, purchases, or uses anything protected by patent during period in which patent has lapsed for failure to pay maintenance fee applies only to persons who first began to make, purchase, or use thing protected by patent during lapse period; it does not immunize discreet products made, used, or sold as part of continuing commercial effort begun before lapse. 35 U.S.C.(1984 Ed.) § 41(c)(2).

15. Patents ⇐259(1)

Manufacturer of magnetic resonance imaging (MRI) scanners that infringed patent did not induce infringement of patent by continuing to service unmarked scanners after manufacturer received notice of patent. 35 U.S.C.A. § 287(a).

16. Patents ⇐255

If patented machine was sold under circumstances that did not subject its seller to damages, then subsequent repair cannot subject seller to damages.

17. Patents ⇐255

One is entitled to repair that which is sold free of liability for patent infringement.

18. Patents ⇐237

Patent infringement under doctrine of equivalents requires proof of insubstantial differences between claimed and accused products or processes.

19. Patents ⇐314(5), 324.5

Infringement of patent under doctrine of equivalents is a question of fact, which appellate court reviews for substantial evidence on appeal from grant of motion for judgment as a matter of law (JMOL).

20. Patents ⇐237

Under doctrine of equivalents, patent concerning technique for using nuclear magnetic resonance (NMR) imaging to detect cancer was infringed by accused machines.

Ronald J. Schutz, Robins, Kaplan, Miller & Ciresi, Minneapolis, Minnesota, argued for the plaintiffs/cross-appellants. With him on the brief were Martin R. Lueck, William L. Norine, and Darren B. Schwiebert.

Donald R. Dunner, Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P., Wash-

ington, DC, argued for the defendants-appellants. With him on the brief were Thomas H. Jenkins and J. Michael Jakes. Also with him on the brief were Carter G. Phillips, Mark E. Haddad, Paul E. Kalb, and Denise W. DeFranco, Sidley & Austin, Washington, DC, Benjamin W. Heineman, Jr., Erwin F. Berrier, Jr., and Molly B. Burke, General Electric Company, Fairfield, Connecticut, Ronald W. O'Keefe and Robert R. Schroeder, General Electric Company, Medical Systems Group, Milwaukee, Wisconsin.

Before LOURIE, Circuit Judge, SKELTON, Senior Circuit Judge, and RADER, Circuit Judge.

LOURIE, Circuit Judge.

General Electric Company, and Drucker & Genuth, MDS, P.C., d/b/a South Shore Imaging Associates (collectively "GE") appeal from the judgment of the United States District Court for the Eastern District of New York denying their motion for judgment as a matter of law ("JMOL") and sustaining a jury's verdict that (1) U.S. Patent 4,871,966 was not invalid and (2) GE infringed the '966 patent and was liable for lost profits and reasonable royalty damages. *Fonar Corp. v. General Elec. Co.*, 902 F.Supp. 330 (E.D.N.Y. 1995). Fonar Corporation and Dr. Raymond V. Damadian (collectively "Fonar") cross-appeal from the district court's judgment granting a motion for JMOL that GE did not induce infringement of the '966 patent and did not infringe U.S. Patent 3,789,832. *Id.* Because the district court erred in its JMOL that GE did not infringe the '832 patent, but did not otherwise err, we affirm-in-part and reverse-in-part.

BACKGROUND

The '966 patent concerns a technique for using a magnetic resonance imaging ("MRI") machine in order to obtain multiple image slices of a patient's body at different angles in a single scan, referred to as multi-angle oblique ("MAO") imaging. Prior art machines were able to obtain multiple parallel images along the same axis in a single scan, but they required multiple scans in order to obtain multiple images at varying angles. MAO resulted in shortened imaging times and hence allowed for the imaging of more patients per day. Claim 1 of the '966 patent recites this feature and reads in part:

> 1. A method for obtaining in the course of a single scan NMR [nuclear magnetic resonance] image data for a plurality of differently oriented selected planes in an object using nuclear magnetic resonance techniques, said method comprising the steps of:
>
> (a) positioning an object in a static homogeneous magnetic field;
>
> (b) determining first and second selected planes in said object for which NMR image data is to be obtained . . .
>
> (c) subjecting said object to a plurality of repetitions of a first repetition sequence composed of NMR excitation and magnetic gradient field pulses, each of said repetitions of said first repetition sequence including the steps of applying an excitation pulse and reading out of an NMR signal produced by said excitation pulse . . . said plurality of repetitions of said first repetition sequence being carried out in a manner to encode spatial information into a first collection of said NMR signals, said first collection of NMR signals being representative of NMR image data for said first selected plane; and
>
> (d) subjecting said object to a plurality of repetitions of a second repetition sequence composed of NMR excitation and magnetic field gradient pulses, each of said repetitions of said second repetition sequence including the steps of applying an excitation pulse and reading out of an NMR signal produced, by said excitation pulse . . . said plurality of repetitions of said second repetition sequence being carried out in a manner to encode spatial information into a second collection of NMR signals, said second collection of NMR signals being representative of NMR image data for said second selected plane;

said plurality of repetitions of said first and second repetition sequences each being carried out during the course of a single scan of said object and each being continued substantially throughout said single scan, the repetition time interval for repeating each of said first and second repetition sequences being substantially the same and said steps of applying an excitation pulse and reading out of an NMR signal for each repetition of said second repetition sequence being performed at a different time during said repetition time interval than each of said steps of applying an excitation pulse and reading out of an NMR signal for said first repetition sequence.

The '832 patent concerns a technique for using NMR imaging to detect cancer. MRI machines rely upon the principles of NMR to produce cross-sectional images of body tissue. The inventor, Dr. Damadian, recognized that two common NMR measurements, T1 and T2, were often different in cancerous tissue compared with normal tissue. Thus, the '832 patent claims a method for detecting cancer by measuring values of T1 and T2 in suspect tissue and comparing them to standard T1 and T2 values for normal and cancerous tissue of the same type. Claim 1 of the '832 patent recites this feature and reads:

1. A method for detecting cancer comprising:

a. measuring and establishing standard NMR spin-lattice relaxation times and spin-spin relaxation times for both normal and cancerous tissue of the type under analysis using as an indictor nuclei at least one nuclei which exhibits deviant behavior in cancerous tissue;

b. measuring the NMR spin-lattice relaxation times and spin-spin relaxation times for the suspected tissue to determine the extent of deviant behavior of the indicator nuclei; and

c. comparing the values obtained in (b) against the standards obtained in (a).

Fonar sued GE for infringement of the two patents, asserting infringement of claims 1, 2, 4, 5, and 12 of the '966 patent and claims 1 and 2 of the '832 patent. A jury returned a verdict finding that the asserted claims were not invalid and were infringed. As compensation for infringement of the '966 patent, the jury awarded Fonar $27,825,000 as lost profits on 75 of the 600 MRI machines sold by GE and $34,125,000 as a reasonable royalty on sales of the remaining 525 machines. The jury awarded Fonar $13,625,000 as damages for GE's inducement to infringe the patent. It also awarded $35,000,000 in reasonable royalty damages for GE's infringement of the '832 patent.

The court granted two of GE's renewed motions for JMOL, ruling that GE did not induce infringement of the '966 patent and that it did not infringe the '832 patent. Specifically, the court concluded that GE could not have induced infringement because it had no notice of the patent. With respect to infringement of the '832 patent, the court found that Fonar failed to establish the existence of standard T1 and T2 values, which are limitations of the asserted claims, and it thus concluded that GE did not infringe that patent.

The court denied GE's motions for JMOL relating to its assertion of a violation of the best mode requirement and to damages for direct infringement of the '966 patent. The court concluded that the testimony of Fonar's witnesses provided substantial evidence to support the jury's finding that the patent satisfied the best mode requirement, and the court found that substantial evidence supported the jury's damages findings. The court summarily denied GE's motions for JMOL relating to the other issues now on appeal. The court awarded Fonar prejudgment interest and entered a final award against GE in the amount of $68,421,726.

GE now appeals to this court, arguing that the district court erred in its judgment concerning validity and infringement of the '966 patent and in determining damages for infringement of that patent. Fonar cross-appeals, challenging the district court's judgment concerning inducement to infringe

the '966 patent and infringement of the '832 patent.

DISCUSSION

[1] On appeal from a judgment denying a motion for JMOL following a jury trial, an appellant "must show that the jury's findings, presumed or express, are not supported by substantial evidence or, if they were, that the legal conclusion(s) implied from the jury's verdict cannot in law be supported by those findings." *Perkin–Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 893, 221 USPQ 669, 673 (Fed.Cir.1984) (citation omitted).

A. *Best Mode of the '966 Patent*

GE argues that the patent fails to disclose two software routines, the LGRAD and GETMAO programs, which the inventors testified were the best means they knew of to accomplish MAO imaging. GE also argues that a critical aspect of the invention, a gradient multiplier board ("GMB"), was not disclosed in sufficient detail to satisfy the best mode requirement. Furthermore, GE argues that the inventors failed to identify a new integrated circuit "chip" for implementing certain functions of the hardware.

Fonar responds that its disclosure was adequate to satisfy the best mode requirement, that the specification adequately describes the functions of the software, and that it is not necessary that the actual computer program be disclosed. According to Fonar, providing a description of the software's functions is what is important for a best mode disclosure, rather than actual source code, because the code was tailored to a specific hardware embodiment and it thus would not necessarily have worked with other hardware. Fonar also argues that the '966 specification adequately disclosed the GMB and the functions of the new "chip."

[2] The patent statute requires that a patent specification "shall set forth the best mode contemplated by the inventor of carrying out his invention." 35 U.S.C. § 112 (1994). Determining whether a patent satisfies the best mode requirement involves two factual inquiries. First, a fact-finder must determine whether at the time an applicant filed an application for a patent, he or she had a best mode of practicing the invention; this is a subjective determination. Second, if the inventor had a best mode of practicing the invention, the fact-finder must determine whether the best mode was disclosed in sufficient detail to allow one skilled in the art to practice it, which is an objective determination. *United States Gypsum Co. v. National Gypsum Co.*, 74 F.3d 1209, 1212, 37 USPQ2d 1388, 1390 (Fed.Cir.1996); *Chemcast Corp. v. Arco Indus. Corp.*, 913 F.2d 923, 927–28, 16 USPQ2d 1033, 1036 (Fed.Cir.1990).

[3] We agree with Fonar that the jury's finding that the '966 patent satisfied the best mode requirement was supported by substantial evidence. There was evidence that the inventors had a best mode, and that the software, the GMB, and the "chip" were part of that best mode. However, with respect to the software routines, Fonar's witnesses testified that the '966 patent contained a sufficient description of the software's functions. Specifically, Robert Wolf, one of the inventors, testified as follows:

> Q. From that written description, is there sufficient description to a software engineer, such as yourself, of what software needs to be written in order to perform the multi-angle oblique invention?
>
> A. Yes.
>
> . . .
>
> Q. In any event, the software, itself, as we see in the hundred pages of Exhibit 816, is not reproduced in its entirety in the patent.
>
> Is that right?
>
> A. That's correct.
>
> Q. Why is that?
>
> A. For a few reasons.
>
> First of all, it's large as you can see. It's several hundred pages. It wouldn't

help someone to have that software anyway because that software only works on a Fonar machine.

What's much more important is to have a description of what the software has to do, and that is what you will find in the patent.

Fonar's witnesses further testified that providing the functions of the software was more important than providing the computer code. We agree.

[4, 5] As a general rule, where software constitutes part of a best mode of carrying out an invention, description of such a best mode is satisfied by a disclosure of the functions of the software. This is because, normally, writing code for such software is within the skill of the art, not requiring undue experimentation, once its functions have been disclosed. It is well established that what is within the skill of the art need not be disclosed to satisfy the best mode requirement as long as that mode is described. Stating the functions of the best mode software satisfies that description test. We have so held previously and we so hold today. *See In re Hayes Microcomputer Prods., Inc. Patent Litigation*, 982 F.2d 1527, 1537–38, 25 USPQ2d 1241, 1248–49 (Fed.Cir.1992); *In re Sherwood*, 613 F.2d 809, 816–17, 204 USPQ 537, 544 (CCPA 1980). Thus, flow charts or source code listings are not a requirement for adequately disclosing the functions of software. *See Sherwood*, 613 F.2d at 816–17, 204 USPQ at 544. Here, substantial evidence supports a finding that the software functions were disclosed sufficiently to satisfy the best mode requirement. *See Hayes*, 982 F.2d at 1537, 25 USPQ2d at 1248–49 (stating that there was no best mode violation where the specification failed to disclose a firmware listing or flow charts, but did disclose sufficient detail to allow one skilled in the art to develop a firmware listing for implementing the invention).

A finding that the GMB was sufficiently disclosed to satisfy the best mode requirement was also supported by substantial evidence. Fonar's witness testified that the '966 patent provided a description of the function of the GMB with reference to the components within the dotted line in Figure 7 of the '966 patent, reproduced below.

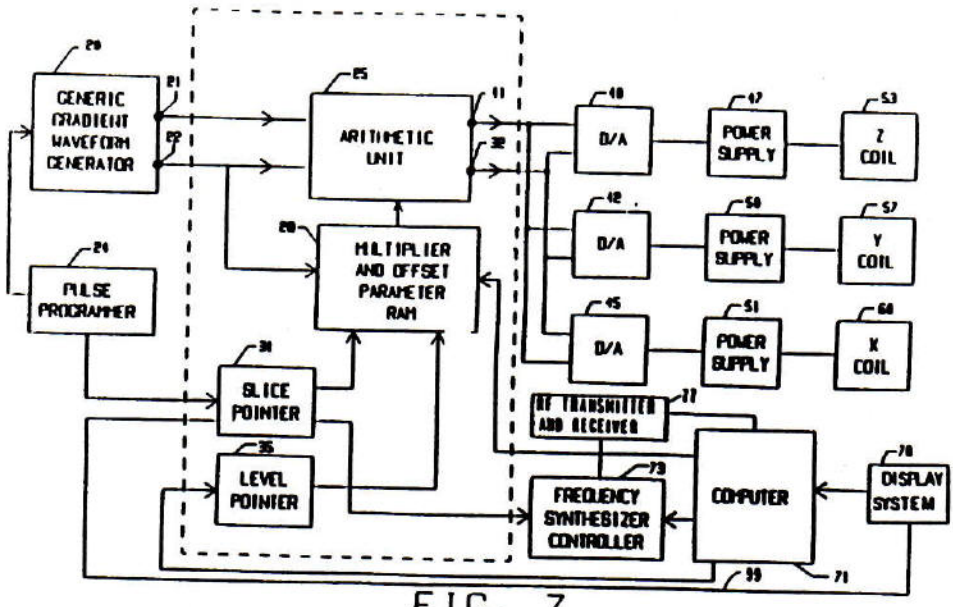

FIG. 7

David Hertz, one of the inventors, testified in particular that the patent provides a description of the functions required for one skilled in the art to build a GMB that will work with a general MRI system and that the GMB disclosed in the patent is the one built by Fonar. More importantly, he testified that the GMB used in the Fonar machine was not the only means to accomplish MAO imaging and that it was not necessarily the best way to do it for every machine. GE argues nonetheless that the '966 patent failed to disclose the use of comparators as part of the GMB, which it alleged were an essential element of the best mode. However, Hertz testified that if an MRI machine performing MAO imaging according to the '966 patent were to require a comparator as part of the GMB, a skilled engineer would know that a comparator should be used. He further testified that each MRI machine has its own set of requirements for the functionality of the GMB, which is why the '966 patent described in general terms how to build the invention. Hertz's testimony provides substantial evidence to support a finding that there was no best mode violation with respect to the GMB.

Substantial evidence also supports the finding that the functions of the new "chip" were disclosed sufficiently to satisfy the best mode requirement. The '966 patent schematically disclosed the functions of that "chip" in Figure 7 and provided a textual description of its functions. *See* '966 patent, col. 13, lines 41–64. Because adequate disclosure of the functions of the "chip" was in the specification, failure to specifically identify a particular manufacturer's "chip" was not fatal to satisfaction of the best mode requirement. Accordingly, the jury's finding that the '966 patent satisfied the best mode requirement was supported by substantial evidence, and the district court did not err in denying GE's motion for JMOL concerning that issue.

B. *Direct Infringement of the '966 Patent*

GE argues that it was entitled to a judgment that its MRI scanners did not infringe the '966 patent. According to GE, each asserted claim contains limitations subject to 35 U.S.C. § 112, ¶ 6, and Fonar submitted no evidence indicating that the accused devices possessed the structure, material, or acts noted in the specification that performed the functions identified by the "means" or "step" limitations. GE argues that its accused scanners did not contain equivalent structure because it did not use a generic gradient wave form.

Fonar responds that the asserted claims are not limited to use of a generic gradient wave form. Fonar points to the specification, which it notes clearly states that other wave forms may be used. It also asserts that while some claims require a generic gradient wave form generator, others do not. Fonar also argues that it submitted evidence that GE's machines used the same or equivalent structure or acts for implementing the functions specified by the asserted claims. In any event, Fonar believes that most of its claims do not contain means plus function language and are accordingly not limited to structure or acts disclosed in the specification, or equivalents thereof.

[6] Determining whether a patent claim has been infringed requires a two-step analysis: "First, the claim must be properly construed to determine its scope and meaning. Second, the claim as properly construed must be compared to the accused device or process." *Carroll Touch, Inc. v. Electro Mechanical Sys., Inc.*, 15 F.3d 1573, 1576, 27 USPQ2d 1836, 1839 (Fed.Cir.1993).

[7] We first address GE's argument that the asserted claims, including method claims, are subject to section 112, ¶ 6. We deal with the method claims first. GE argues in particular that each asserted method claim invokes section 112, ¶ 6, because it was drafted "functionally in a result-oriented way" by reciting that the pulse sequences must be applied in a manner to encode spatial information without reciting structure or acts that would enable such a result.

We need not address the question whether section 112, ¶ 6, applies to these claims. That is because we agree with Fonar that the method claims looked at with or without the section 112, ¶ 6 limitation are not limited to

use of a generic gradient wave form. Although the '966 specification discloses a "generic gradient wave form generator" (20) in Figure 7, along with a corresponding description, it states that the "generator 20 also stores the phase encoding wave form, as illustrated in FIG. 2, in digital form. Preferably, the generator 20 stores these particular wave forms; but, may store others that suffice for purposes of the present invention." Col. 12, lines 42–46. The claim language in question, applying pulses in a manner to encode spatial information, does not recite use of generic gradient wave forms; it tracks the specification which states that other wave forms may be used.

There was substantial evidence to support the jury's finding that the method claims were infringed. Thomas Gafford, as expert witness for Fonar, testified that the accused devices infringed the asserted claims because they performed the steps defined in the claims using the same or equivalent acts. He stated that in forming his opinion he relied upon the technical literature, specifications, and drawings of the accused GE machines. The jury could have reasonably relied upon his testimony in rendering its verdict that the accused machines met the limitations of the asserted claims however they are interpreted; its finding of infringement is thus supported by substantial evidence.

[8] As for apparatus claim 12, it does include means clauses. The limitations that GE argues are subject to section 112, ¶ 6, are shown below with our emphasis added.

> 12. Apparatus for . . .
>
> . . .
>
> (c) *means* for actuating and controlling said magnetic field applying means and said radio frequency applying means to:
>
> (1) apply a first sequence including a first slice selector magnetic field gradient in a first direction concomitantly with a first RF excitation pulse at a first frequency to thereby excite nucleii [sic] only in a first plane perpendicular to said first direction, whereby a first NMR signal will be emitted only by nucleii [sic] in said first plane, said first sequence further including at least one encoding magnetic field gradient operative *to encode spatial information into said first NMR signal;*
>
> (2) apply a second sequence including a second slice selector magnetic field gradient in a second direction different from said first direction concomitantly with a second RF excitation pulse at a second frequency different from said first frequency to thereby excite nucleii [sic] only in a second plane perpendicular to said second direction whereby a second NMR signal will be emitted only by nucleii [sic] in said second plane, said second sequence further including at least one encoding magnetic field gradient operative *to encode spatial information into said second NMR signal;* . . . .

An apparatus claim requires definite structure in the specification to support the function in a means clause. Because claim 12 does not recite such structure in support of the defined function, it is therefore subject to section 112, ¶ 6. *See Cole v. Kimberly–Clark Corp.*, 102 F.3d 524, 531, 41 USPQ2d 1001, 1006 (Fed.Cir.1996); *see also Greenberg v. Ethicon Endo–Surgery, Inc.*, 91 F.3d 1580, 1584, 39 USPQ2d 1783, 1787 (Fed.Cir.1996) (stating that "the use of the term 'means' has come to be so closely associated with 'means-plus-function' claiming that it is fair to say that the use of the term 'means' (particularly as used in the phrase 'means for') generally invokes section 112(6) and that the use of a different formulation generally does not."). Accordingly, we construe the "means" limitation in question in light of the corresponding structure or acts disclosed in the specification and their equivalents. *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1580, 12 USPQ2d 1382, 1386–87 (Fed.Cir.1989). The '966 specification discloses use of a generic gradient wave form. Although it states that other wave forms may be used, it fails to specifically identify those wave forms. Thus, under section 112, ¶ 6, claim 12 is limited to use of a

generic gradient wave form and its equivalents.

We also conclude that the jury's finding that the accused machines contained the elements of the apparatus claim is supported by substantial evidence. Gafford testified that the accused devices infringed claim 12 because they performed the identical functions as specified, contained the same or equivalent structure, and performed the steps defined in the claim using the same or equivalent acts. He stated that in forming his opinion he relied upon the technical literature, specifications, and drawings of the accused GE machines. The jury could have reasonably relied upon his testimony in rendering its verdict that the accused machines met the limitations of the asserted claim, and contained equivalent structure or acts where necessary to meet the limitations subject to section 112, ¶ 6; its finding of infringement is thus supported by substantial evidence. *See Consolidated Edison Co. v. National Labor Relations Bd.*, 305 U.S. 197, 229, 59 S.Ct. 206, 216–17, 83 L.Ed. 126 (1938) (defining substantial evidence as "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion"). Accordingly, the district court did not err in denying GE's motion for JMOL concerning direct infringement of the asserted claims of the '966 patent.

C. *Damages for Infringement of the '966 Patent*

GE argues that the jury's findings concerning damages were not supported by substantial evidence. It argues that reasonable royalty damages were incorrectly based upon the sales of the entire MRI machines rather than the value of the improvement covered by the claimed invention, and that Fonar submitted no substantial evidence to show that the MAO feature was the basis for the customer demand for the entire machine. It argues that the effective royalty rate awarded has no support in the record and that the evidence indicated that GE entered into sixteen license agreements in which the royalty rate was significantly lower.

Fonar responds that GE incorrectly assumes that Fonar would have licensed the technology to a competitor for the same rate that it would have licensed a customer. Furthermore, Fonar argues that the entire market value rule entitles it to a royalty based upon the value of the entire MRI machine even when the patented feature was only a part of it, and that testimony by Fonar's witnesses supported an even higher royalty than that awarded by the jury.

The patent statute provides that

> Upon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.

35 U.S.C. § 284 (1994).

[9, 10] Under the entire market value rule, it was not improper for the jury to base a reasonable royalty on the value of the entire accused MRI machines. That rule "allows for the recovery of damages based on the value of an entire apparatus containing several features, even though only one feature is patented." *Paper Converting Mach. Co. v. Magna–Graphics Corp.*, 745 F.2d 11, 22, 223 USPQ 591, 599 (Fed.Cir.1984). This is permitted when the patented feature is the basis for customer demand for the entire machine. *Rite–Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1549, 35 USPQ2d 1065, 1073 (Fed. Cir.) (in banc), *cert. denied*, — U.S. —, 116 S.Ct. 184, 133 L.Ed.2d 122 (1995). There was evidence from which the jury could have concluded that was the case here. GE's own technical literature of record emphasized the MAO feature. A brochure for GE's Signa machine highlighted MAO in 1987, stating that "[m]ulti-slice, multi-angle capabilities offer direct acquisition of multiple view angles in one acquisition." Several other brochures of GE machines also identified the MAO feature. One GE brochure, entitled "Multi-angle MR imaging," states that: "A recent advance at GE Medical Systems, however, is helping to enhance efficiency and patient

throughput. Multi-angle imaging, featured on all Signa® systems, allows a single scan to be graphically prescribed with each slice—or group of slices—acquired at a different angle." There was thus substantial evidence to support an award of a reasonable royalty based upon the cost of the entire accused machines.

[11] We agree with Fonar that the jury's award of reasonable royalty damages was also supported by substantial evidence. Dr. Laurits Christensen, an expert witness for Fonar, testified that one-quarter to one-third of the anticipated profits on the sale of the infringing machines would have constituted a reasonable royalty and that this estimate would have resulted in a royalty of 7.25 percent, or $54 million, for the 525 accused machines. This was higher than the royalty of $34.125 million awarded by the jury. Also, GE had itself entered into a license agreement for MRI technology at a rate of seven percent.

GE argues that the lost profits award on all of its sales incorrectly assumed that Fonar would have made sales in markets in which Fonar did not compete with GE. GE argues that Fonar failed to adequately prove that there was a lack of noninfringing substitutes. Fonar responds that there were no noninfringing substitutes, that purchasers were motivated to buy the machines because of the MAO feature and that the alleged substitutes lacked that feature. Fonar also asserts that it had the capacity to manufacture and sell the machines whose sales it lost to GE.

[12, 13] In order to be entitled to lost profits, a patentee must show a reasonable probability that it would have made the sales "but for" the infringement. *Rite-Hite*, 56 F.3d at 1545, 35 USPQ2d at 1069. This may be done by means of the four-factor *Panduit* test, requiring proof of demand for the patented product, lack of acceptable noninfringing substitutes, capacity by the patentee to meet the demand, and the amount of profit patentee would have made. *See Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156, 197 USPQ 726, 729–30 (6th Cir.1978). "The burden then shifts to the infringer to show that the inference is unreasonable for some or all of the lost sales." *Rite-Hite*, 56 F.3d at 1545, 35 USPQ2d at 1069.

We agree with Fonar that the jury's award of lost profits was supported by substantial evidence. Dr. Damadian testified that there was no acceptable alternative to MAO imaging. He testified that the available alternatives would have led to a significant compromise in speed and quality in comparison to using MAO. One alternative, according to Dr. Damadian, would have been 3D imaging. He testified, however, that in using 3D imaging, the amount of time required to collect the data would have resulted in a prohibitively long time for a patient to remain in a scanner. Other techniques referred to as "fast imaging techniques such as fast spin echo or echo plane" would have involved obtaining single scanned "slices" at a high speed and converting them into an assembly of multiple angles; however, Dr. Damadian testified that these techniques would have resulted in an unacceptable image quality. In addition to this evidence that no acceptable alternative to MAO imaging existed, Dr. Christensen testified that all competing machines with the MAO capability infringed the '966 patent.

There was also substantial evidence that Fonar had the capacity to manufacture machines whose sales it lost. Through the testimony of Dr. Damadian, Fonar proved that in 1988 it could manufacture eight machines per month. He testified that in 1989, Fonar had 600–650 employees and a fast growth rate, having appeared for two consecutive years on Inc. magazine's list of the fastest growing companies. Based on Fonar's growth rate, Dr. Damadian testified that Fonar's capacity would have increased to 500 machines per year by 1992. Accordingly, the district court did not err in denying GE's motion for JMOL concerning damages for direct infringement of the '966 patent.

D. *Lapse of the '966 Patent*

GE argues that both the royalty and the lost profits awards must be vacated because

Fonar may not recover damages attributable to the period in which the '966 patent was lapsed for lack of a timely maintenance fee payment. It argues that 35 U.S.C. § 41(c)(2) provides rights analogous to intervening rights under reissue patents, and that, under that section, GE had an absolute right to sell MRI machines free of infringement during the time period that the '966 patent lapsed.

Fonar responds that GE did not acquire "intervening rights" to infringe the '966 patent during the relevant time period. According to Fonar, GE's interpretation of section 41(c) is contrary to its language and legislative history; the provision expressly states that upon acceptance of a late maintenance fee the patent shall be considered as not having expired. Fonar argues that the legislative history indicates that the provision applies only to those who first began using or first took steps to begin using a patent that had expired for failure to pay a maintenance fee and that it does not apply to GE, which had infringed the patent since 1992 and did not first begin infringing during the lapse period.

The applicable statutory provision states in relevant part that

> No patent, the term of which has been maintained as a result of the acceptance of a payment of a maintenance fee under this subsection, shall abridge or affect the right of any person or his successors in business who made, purchased or used after the six-month grace period but prior to the acceptance of a maintenance fee under this subsection anything protected by the patent, to continue the use of, or to sell to others to be used or sold, the specific thing so made, purchased, or used.

35 U.S.C. § 41(c)(2) (1994).

[14] This provision was intended to protect the rights of those who, in reliance on the lapse, first began using the claimed invention or who first took steps to begin using it during the lapse period. In particular, the legislative history states that

> A provision is included to protect the rights of one who began using or who took steps to begin use of a patent which expired for failure to pay a maintenance fee and which was subsequently reestablished by acceptance of the late payment. The intervening rights provision in section 41(c)(2) is similar to the intervening rights provision in 35 U.S.C. 252 concerning reissued patents.

H. Rep. No. 97–542, at 8 (1982), *reprinted in* 1982 U.S.C.C.A.N. 772. We interpret the language "who made, purchased or used" to mean "who first began to make, purchase, or use anything protected by the patent during the lapse period." It does not immunize discreet products made, used, or sold as part of a continuing commercial effort begun before the lapse. It is undisputed that GE began infringing the '966 patent before it lapsed; it thus did not engage in the type of activity that the statute was intended to protect. Furthermore, the preceding statutory provision states that "[i]f the Commissioner accepts payment of a maintenance fee after the six-month grace period, the patent shall be considered as not having expired at the end of the grace period." 35 U.S.C. § 41(c)(1) (1994). Thus, a patent is retroactively rendered enforceable during the lapse time period when the Commissioner accepts a late payment. Accordingly, GE was not entitled to the protection of section 41(c)(2); the district court did not err in denying GE's motion for JMOL concerning the damages attributable to the lapse period.

E. *Inducement to Infringe the '966 Patent*

In its cross-appeal, Fonar argues that the district court erred when it overturned the jury's verdict finding that GE induced infringement of the '966 patent. It argues that it submitted substantial evidence that GE induced infringement by continuing to service scanners that it sold before receiving notice of the patent. GE responds that Fonar failed to mark the scanners that are the subject of its inducement claim and that there is no liability for inducement to infringe where the original purchaser had a right to repair and service the scanners.

The statute concerning patent marking states in relevant part that

> In the event of failure so to mark, no damages shall be recovered by the patentee in any action for infringement, except on proof that the infringer was notified of the infringement and continued to infringe thereafter, in which event damages may be recovered only for infringement occurring after such notice.

35 U.S.C. § 287(a) (1994).

[15–17] GE is correct. The machines in question were not marked, so that no damages were recoverable before notice was given. Moreover, servicing of the machines was analogous to repair, *see Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 346, 81 S.Ct. 599, 604–05, 5 L.Ed.2d 592, 128 USPQ 354, 359 (1961), and repair is not infringement. If a machine was sold under circumstances that did not subject its seller to damages, then subsequent repair cannot subject it to damages. One is entitled to repair that which is sold free of liability for infringement. Therefore, the district court did not err in granting GE's motion for JMOL that it did not induce infringement of the '966 patent.

F. *Direct Infringement of the '832 Patent*

Fonar argues that it presented substantial evidence of GE's infringement of the '832 patent under the doctrine of equivalents and that the district court therefore erred in granting a motion for JMOL that GE did not infringe that patent. GE responds that its accused machines do not perform the steps of asserted claim 1, either directly or equivalently.

[18, 19] A patent may be infringed under the doctrine of equivalents by manufacture, use, or sale of subject matter equivalent to that literally claimed. Infringement under the doctrine "requires proof of insubstantial differences between the claimed and accused products or processes." *Hilton Davis Chem. Co. v. Warner–Jenkinson Co.*, 62 F.3d 1512, 1521–22, 35 USPQ2d 1641, 1648 (Fed.Cir. 1995), *cert. granted*, — U.S. —, 116 S.Ct. 1014, 134 L.Ed.2d 95 (1996). Infringement under the doctrine is a question of fact, which we review for substantial evidence on appeal from a grant of a motion for a JMOL. *Id.* at 1522, 35 USPQ2d at 1648.

[20] We agree with Fonar that the jury's verdict finding infringement under the doctrine of equivalents was supported by substantial evidence. With respect to element (a) of claim 1, there was evidence showing existence of standard values for T1 and T2. In particular, GE scientists published an article in which they compiled reported values for T1 and T2. P.A. Bottomley et al., *A Review of 1H Nuclear Magnetic Resonance Relaxation in Pathology: Are T1 and T2 Diagnostic?*, Medical Physics, Jan./Feb.1987, at 1. This evidence provided a showing that GE's machines met step (a) of claim 1 at least equivalently by the insubstantial difference, if any, between standard values required by this limitation and GE's compiled values of T1 and T2.

There was also evidence presented that GE's machines performed an equivalent to step (b) of claim 1. GE's machines used a T1–weighted image and a T2–weighted image for detecting cancer. A T1–weighted image was a function of T1 and machine parameters; a T2–weighted image was a function of T2 and the machine parameters. There was testimony that the T1– and T2–weighted images were primarily controlled by T1 and T2 respectively. In particular, Dr. Damadian testified that a T1 image was controlled by the T1 relaxation time. Even Dr. Mezrich, GE's expert witness, agreed that T1– and T2–weighted images were images whose contrast was primarily determined by differences in T1 and T2. In its reference manual, GE stated that T1–weighted images "rely heavily on T1 relaxation information." This evidence provided a showing that GE's use of T1– and T2–weighted images were essentially controlled by the values of T1 and T2 and were thus an insubstantial difference from the use of T1 and T2 values as required by step (b) of claim 1.

Finally, there was evidence that GE's machines performed an equivalent to the com-

parison required by step (c) of claim 1. There was evidence that GE used its compiled standard values to produce precalibrated gray scale values. When GE's machines scanned suspect tissue in order to obtain a signal strength for a voxel, the volume element in the body corresponding to one pixel in the image, that signal strength was matched to a value within the precalibrated gray scale values. Thus, the assignment of a gray scale value for suspect tissue was determined in effect by a comparison of the tissue's signal strength with the standard values. This evidence provided a showing of insubstantial differences between this determination and the comparison required by step (c) of claim 1. Therefore, there was substantial evidence upon which the jury rendered its verdict finding that the accused machines infringed the asserted claims of the '832 patent under the doctrine of equivalents, and the district court erred in granting the motion for JMOL to the contrary.

COSTS

Each party shall bear its own costs.

CONCLUSION

The district court did not err in its judgment denying GE's motions for JMOL and sustaining the jury's verdict that (1) the '966 patent was not invalid for failure to satisfy the best mode requirement; (2) GE infringed the '966 patent and was liable for lost profits and reasonable royalty damages; and (3) GE was liable for infringement during a time period when the '966 patent lapsed for lack of a timely maintenance fee payment but was subsequently reinstated. It did not err in granting GE's motion for JMOL that it did not induce infringement of the '966 patent, but it did err in granting the motion for JMOL that GE did not infringe the '832 patent. Accordingly, we reverse the district court's judgment granting GE's motion for a JMOL that it did not infringe the '832 patent, and we reinstate the jury verdict finding infringement of that patent and awarding $35 million in damages as compensation for that infringement. We otherwise affirm the district court's judgment.

AFFIRMED–IN–PART AND REVERSED–IN–PART.

CAMPBELL SOUP COMPANY, INC., Plaintiff–Appellant,

v.

The UNITED STATES, Defendant–Appellee.

No. 94–1435.

United States Court of Appeals, Federal Circuit.

March 3, 1997.

Importer brought action challenging appraisal of its merchandise by United States Customs Service. The United States Court of International Trade, Gregory W. Carman, Chief Judge, 853 F.Supp. 1443, granted summary judgment in favor of government. Importer appealed. The Court of Appeals, Archer, Chief Judge, held that: (1) Customs Service was required to exclude rebates of internal Mexican taxes directly applicable to materials from cost or value of materials in determining computed value of imported merchandise, and (2) freight costs within country of exportation were properly included within merchandise's dutiable value.

Affirmed in part and reversed in part.

Pauline Newman, Circuit Judge, concurred in part and dissented in part with opinion.